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Operational Management Processes in Mountain Bike Enduro Competitions: A Case Study of the Apuseni Bike Cup

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ABSTRACT. Operational Management Processes in Mountain Bike Enduro Competitions: A Case Study of the Apuseni Bike Cup. **Objectives**: The primary aim of this research is to evaluate the efficiency of the operational process of the Apuseni Bike Cup 2024 and identify critical points, in order to improve organizational performance and the participants' experience. The study analyses how operational activities were planned and carried out, how responsibilities were allocated within the organizing team and how effectively control mechanisms supported responses to unforeseen situations. **Materials and Methods:** This study employed a mixed-methods design, integrating both quantitative and qualitative procedures to analyse the operational management of the Apuseni Bike Cup. Quantitative data were collected through two structured questionnaires administered to 57 participants and 6 members of the organising team, each instrument combining Likert-scale items, yes/no questions and open-ended responses tailored to the role of the respondents. To enhance the depth and reliability of the analysis, the questionnaire data were complemented with direct field observations recorded during the preparation and running of the event, as well as with internal organisational documents used throughout the planning process. **Results**: The Apuseni Bike Cup 2024 achieved some of its goals, but not all. Only a third of organizers felt the objectives were fully met, while half said they were only partially achieved. Challenges were reported in managing resources, assigning tasks and handling critical situations. Most

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participants were satisfied, noting clear information, well-marked trails and good support, though some mentioned issues with communication and logistics. Overall, the results suggest the event worked well in many areas but could be improved to fully reach its objectives in future editions. **Conclusions:** The research confirms that effective operational management is essential for delivering a well-organized sporting event, ensuring participant support, clear communication and smooth logistics. Addressing challenges in resource allocation, task distribution and team coordination is expected to further improve outcomes, providing organizers with opportunities to enhance efficiency and participant experience in future editions.

Keywords: *Sport event management, mountain bike enduro, operational management, participant experience*

INTRODUCTION

Sport events have become key drivers of community development and local tourism due to their ability to attract participants, spectators and investors from various regions and even countries (Mallen & Adams, 2008). Masterman (2021) emphasizes that such events stimulate the local economy, generate significant revenues for local businesses and create direct employement opportunities. For instance, the Olympic Games produce substantial tourism income, enhance international visibility and contribute to infrastructure development, providing lasting benefits for host communities (Masterman, 2009). Mountain bike competitions, including international downhill events, similarly promote local tourism by attracting athletes and enthusiasts from around the world (Tsuji, Bennett, & Zhang, 2007).

The organization of a sport event involves four fundamental stages, each characterized by clearly defined strategic approaches, as outlined by Masterman, (2014): planning, implementation, monitoring and evaluation. The planning stage involves clearly defining the event's purpose, establishing specific objectives, identifying potential risks and developing comprehensive strategies to address them effectively. Implementation focuses on the efficient management and use of available human, material and financial resources to achieve the established objectives. Monitoring ensured continuous oversight of operational activities and the prompt management of unforeseen situations to maintain smooth event conduction. Evaluation examines the efficiency of resource utilization and identifies areas requiring improvement for future events (Masterman, 2014).

In mountain bike competitions, each stage is critical for participant safety, overall satisfaction and logistical efficiency (Mallen & Adams, 2024).

Enduro mountain bike competitions are characterized by a unique format that alternates timed downhill sections (special stages) with untimed transfer segments, usually uphill, which place significant physical demands on the participants motor skills. This type of competition requires both advanced technical skills and superior physical fitness, as athletes were placed under sustained cardiovascular effort over extended periods (Impellizzeri & Marcora, 2007).

Enduro athletes need to possess a well-developed aerobic capacity, combined with anaerobic endurance adapted to high-intensity efforts. Studies on elite competitors indicate average VO_2max values between 70 and 75 $ml \cdot kg^{-1} \cdot min^{-1}$, occasionally exceeding 80 $ml \cdot kg^{-1} \cdot min^{-1}$ in the most highly trained athletes. During races, the mean heart rate of these athletes ranges from 86% to 90% of their maximum heart rate (Lee et al., 2002; Carpes, Mota, & Faria, 2007).

In organizing mountain bike enduro competitions, the competition track often represents the central „product of the event", with the riders' experience defined by its difficulty, safety and clarity of markings (Mallen & Adams, 2008).

Organizers adopt a strategic design approach, combining technical sections (areas with rocks or exposed roots) with wide, fast segments intended to maintain competitive rhythm thourghout the race (Koemle & Morawetz, 2016). Difficulty levels, ranging from "green" for beginners to "black" for experts, are standardized using internationally recognized color codes and graphical symbols (Masterman, 2021).

Accurate timekeeping constitutes a fundamental pillar of credibility in mountain bike competitions, given that recorded times directly determine athlete rankings, prize allocation, and overall sporting integrity. Masterman, (2009) emphasises the necessity of implementing a rigorous timing-system verification protocol, which includes the simultaneous deployment of multiple technologies (e.g., RFID, photocells, backup chronometers) and the execution of three consecutive test runs on the morning of the event to ensure precision to the hundredth of a second.

Strategic planning begins with the formulation of SMART objectives (specific, measurable, achievable, relevant, and time-bound), established on the basis of clearly defined criteria such as expected community impact, projected participation levels, financial performance indicators, and environmental sustainability targets (Masterman, 2021). Risk analysis entails the systematic identification of potential hazards, the evaluation of their likelihood and consequences, and the development of contingency strategies. Resource planning requires a precise estimation of personnel, equipment, facilities, and financial

inputs needed for effective event delivery (Kokolakis, 2018). Within the context of Enduro mountain bike events, detailed race track design and discipline-specific risk assessments are critical to ensuring both operational success and participant safety.

This study focuses on a comprehensive analysis of the "Apuseni Bike Cup", an emblematic mountain bike enduro competition organised annually by the sports club association "ACS CUBS Cluj-Napoca". Since its inaugural edition on 9 July 2022, the event has demonstrated continuous development, culminating in the 28–29 September 2024 edition held in Buscat, Cluj-Napoca. The 2024 edition constituted a substantial organisational undertaking, as it simultaneously hosted the National Mountain Bike Enduro Championship, thereby increasing the operational complexity and strategic responsibilities of the organising team.

The study examines the organizational and logistical dimensions of the event in a concrete and applied manner, with the primary objective of evaluating the efficiency of human and financial resource management, the clarity of responsibility distribution and the handling of unforeseen operational challenges. The findings are intended to serve as a valuable resource for practitioners seeking to implement innovative, efficient, and sustainable management practices, ultimately supporting the development of a more robust and engaged mountain bike community in Romania and promoting the broader values of active and healthy living.

PURPOSE OF THE STUDY

The objective of this study was to assess the efficiency of operational management within a mountain bike enduro event, focusing specifically on the planning, coordination, and execution of essential organisational processes. By examining the operational structure of the "Apuseni Bike Cup 2024", the research aims to highlight the practices that contribute to a coherent, safe, and effectively managed competition.

MATERIAL AND METHODS

This study involved the "Apuseni Bike Cup 2024", an event chosen as the primary case due to its scale, organisational complexity and relevance within the Romanian mountain bike enduro competitions. Held on 28–29 September 2024 in the Băișorii Mountain Resort area of the Apuseni Mountains, the competition brought together both elite and recreational athletes. Organised under the authority

of the Romanian Cycling Federation, the event served simultaneously as the National Enduro Championship for licensed riders, while also welcoming amateurs, hobby cyclists, youth competitors and E-MTB participants. The race stages were manually constructed single-trail segments ranging between 1.1 and 1.5 km, each designed to test advanced technical skills and reflect the terrain-specific challenges characteristic of mountain bike enduro competitions.

To understand how operational management functions in practice within a mountain bike enduro event, within the study, we examined two key groups whose perspectives together provide a comprehensive view of the organisational process: the organising team and the event participants. These complementary viewpoints reveal both the internal mechanisms of event execution and the participant experience shaped by those mechanisms.

The first group consisted of six members of the Apuseni Bike Cup 2024 organising committee, whose responsibilities covered essential operational components such as logistics, trail planning, timekeeping, volunteer coordination and the allocation of human, technical and financial resources. The organisers completed their questionnaire between October 2024 and May 2025, allowing sufficient time for reflective assessment of each phase of planning and implementation.

The second group comprised 57 riders from various competition categories. Their feedback was collected shortly after the event, between 3 and 11 October 2024, when perceptions related to course safety, trail design, logistical organisation and overall event satisfaction were still fresh and accurately remembered. To gather these perspectives, the study employed two tailored questionnaires. Following the evaluation framework outlined by Tsuji et al. (2007), the participant questionnaire captured five core dimensions of event quality: perceived difficulty (rated on a 1–5 scale), logistical efficiency, clarity of trail marking, safety and overall impression.

Both surveys integrated Likert-scale items, yes or no questions and open-ended prompts, enabling respondents to provide structured ratings alongside more detailed qualitative insights. Questionnaires were distributed online via direct links, and all responses were collected anonymously to encourage candid and unbiased input. After data collection, responses from both groups were systematically organised and coded in Microsoft Excel, creating a structured dataset for subsequent quantitative and qualitative analysis. Together, these procedures generated a multidimensional view of how organisational decisions shaped the execution and lived experience of the Apuseni Bike Cup 2024. Table 1. provides the items included in both questionnaires, illustrating the combination of quantitative and qualitative measures employed.

Table 1. Surveys for both respondent groups

Respondent Group	Questions
I. Organizers	1.1 To what extent were the objectives of this event achieved? 1.2 Was the time allocated for event planning sufficient? (Yes/No) 1.3 How were the resources managed in preparing the event? 1.4 Was the distribution of tasks and responsibilities within the team effective? (Yes/No) 1.5 How effective was the collaboration with volunteers, sponsors, and the marking/kit teams? 1.6 How efficient was the allocation and management of human, technical and financial resources?
II. Participants	2.1 How would you rate the overall organization of the event? 2.2 Did you receive enough information about the competition, both before and during the event? (Yes/No) 2.3 Did you receive accurate and complete information regarding the trails, markings and safety measures? 2.4 Would you recommend this event? (Yes/No) 2.5 Which aspects of the event's organization do you consider were most successful? 2.6 What aspects do you think should be improved for future editions?

RESULTS

From the perspective of being directly involved in the organising team, the most valuable aspect of the planning phase was the high level of interdepartmental coordination. Weekly briefings and constant communication via shared digital channels allowed rapid decision-making and immediate redistribution of tasks when unexpected issues emerged. Direct field visits to the trail area, performed together with the technical and safety teams, provided a precise understanding of environmental constraints, which facilitated informed adjustments to trail marking, shuttle logistics and staffing needs. Competition was planned with careful attention to detail, beginning 4 months prior to the event. Tasks were clearly categorized (e.g. marketing, logistics, technical team, volunteers) and assigned to responsible team members with realistic deadlines. All planning was documented in Microsoft Excel, allowing team members to update progress

as tasks were completed. Key features of the planning process included a clear task structure, detailed budgets for each logistical component, a staged timeline covering pre-event, race-day and post event activities, and a color-coded status system that allowed the team to monitor progress. Continuous monitoring enables real-time adjustments to operational strategies, helping maintain high standards of quality and safety (Pott, Breuer, & ten Hompel, 2023).

The analysis of the questionnaire responses provides a comprehensive overview of how the event was perceived by both organizers and participants. The results are organized according to the core dimensions investigated in the study: achievement of event objectives, communication effectiveness, team management practices: including task distribution, coordination and problem-solving, as well as the aspects that functioned effectively and those requiring improvement. The presentation of findings is structured in two stages. First, the perspectives of the organizers are examined, offering insight into internal operational processes and managerial challenges. This is followed by the participants' evaluations, which capture the external experience of the event, including communication quality, trail information, safety measures and overall satisfaction.

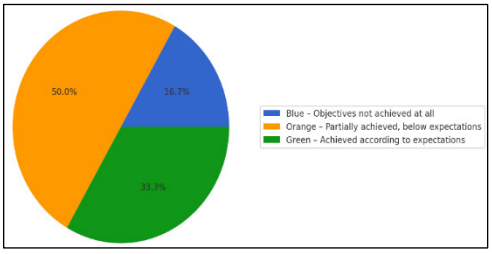

Fig. 1. To what extent were the objectives of this event achieved?

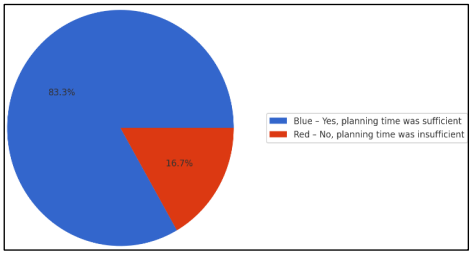

Fig. 2. Was the time allocated for event planning sufficient?

In response to the question on whether the event's objectives were achieved, 50% of the organizers indicated that the objectives were only partially met. A further 16.7% reported that the objectives were not met at all, while 33.3% stated that the objectives were achieved as expected (Fig.1). None of the respondents indicated that the objectives were exceeded. According to Fig.2, the majority of respondents, 83.3%, reported that the allocated preparation period, which spanned several months prior to the event, was sufficient to organize all necessary operational details, whereas 16.7 considered the available time inadequate.

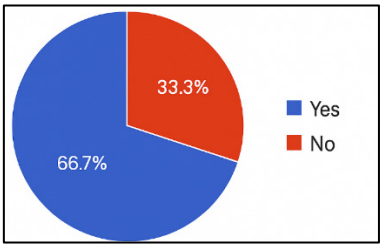

Fig. 3. Was the distribution of tasks and responsibilities within the team effective?

According to the results shown in Fig. 3, 66.7% of organizers reported that the distribution of tasks within the team was effective, ensuring a clear operational structure and facilitating smooth coordination. On the other hand, 33.3% of respondents noted that certain responsibilities remained unclear, indicating opportunities to further refine role allocation.

Table 2. Assessment of Resource Allocation Efficiency

Response	Nr. organizers
Yes/balanced	2
Partially/could be improved	2
No/inefficient	1
Ambiguous/not classified	1

Among the six organizers, two indicated that resources were allocated in a balanced and effective way, supporting smooth event operations. Another two organizers considered the distribution of resources only partially satisfactory, highlighting areas where adjustments could enhance efficiency. One respondent reported significant deficiencies in resource management and one response was too vague to categorize, leaving its assessment of resource allocation unclear.

Table 3. Management of Challenges Encountered

Category	Nr. Org.	Example
Effective management	2	*"Yes, we addressed the issues that arose adequately."*
Partial management -requiring contingency planning	2	*"It would be helpful to have back up plans for all potential problem scenarios."*
Critical issues	2	*"The problems that occurred at the premiere, shuttle transport and timekeeping were not handled appropriately"*

An assessment of the organizers' responses showed that two considered operational challenges to have been managed effectively, reflecting competent real time decision-making. Another two highlighted that the absence of pre-established contingency plans limited their ability to address unexpected issues. The final two reported significant difficulties in managing critical aspects, especially final timekeeping results and the coordination of the premiere ceremony.

Table 4. Well-Executed Aspects of the Event

Nr.	Example	Highlighted aspects
1	*"Collaboration with sponsors, race kits, marking of the trails, decision to move the event to Saturday."*	Sponsors, race kits, trails, scheduling adjustments
2	*"Trail design, hydration point and placement of the Race Village."*	Trails quality, layout of competition and vendor area
3	*"Allocation of resources, management of volunteers."*	Efficient resource distribution, volunteer coordination
4	*"Starting the organization early and being more digitalized compared to previous editions."*	Early initiation of preparations, digitalization of operational processes

Organizers highlighted several strengths that contributed to the smooth running of the event. They emphasized the benefits of early planning, clear coordination of volunteers and sponsors, well executed trail markings, efficient digital management of processes and timely adjustments to the schedule. These factors collectively ensured that the event was well structured and operationally effective.

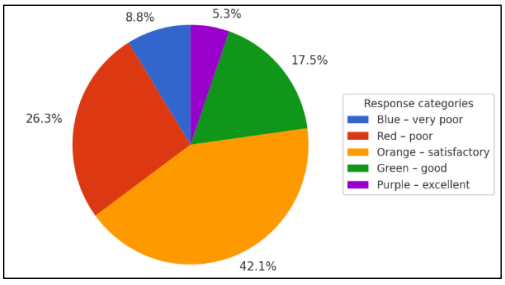

Fig. 4. How would you rate the overall organization of the event?

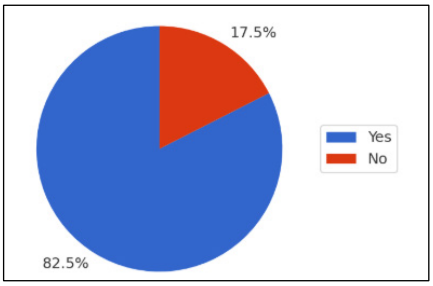

Fig. 5. Communication efficiency before and during the event

According to Fig. 4, the 57 respondents, 42.1% rated the overall organization of the event as "satisfactory", while 26.3% considered it "poor", 17.5% described it as "good", 8.8% as "very poor" and only 5.3% rated it as "excellent". These results indicate that, while a majority found the event organization acceptable, there is a notable proportion of participants who perceived significant areas for improvement. The results revealed that most participants, 82.5%, reported receiving sufficient information both prior to and during the competition, whereas 17.5% expressed dissatisfaction with the volume or clarity of communication (Fig. 5). These findings suggest that, while most of the participants felt well-informed, there remains a need to enhance communication strategies.

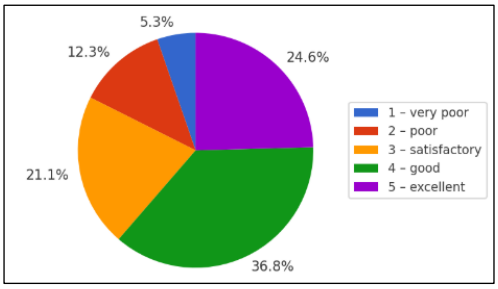

Fig. 6. Information regarding trails markings and safety measures

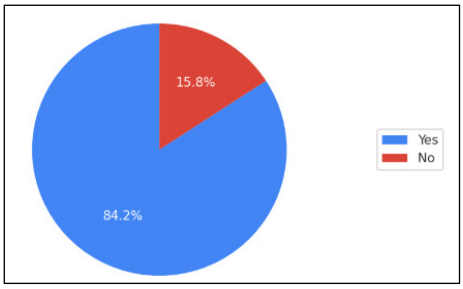

Fig. 7. Would you recommend this event?

Regarding the clarity and adequacy of information on trails markings and safety measures, participants reported varied levels of satisfaction. Among the 57 respondents, 36.8% rated the information as "good", 24.6% as "excellent" and 21.1% as "satisfactory". Contrarily, 12.3% considered the information "poor", while 5.3% classified it as "very poor". These results indicate that, although the majority viewed the provided information positively, a notable minority experienced difficulties in understanding or accessing key details related to course navigation and safety protocols.

Out of the 57 respondents, 84.2% indicated that they would recommend the event to others, whereas 15.8% stated that they would not do so.

Table 5. Key Event Elements Positively Evaluated by the Participants

Key strengths	Nr. of mentions	Key strengths	Nr. of mentions
Racing trails	13	Information/communication	5
Course markings	7	Staff and volunteers	4

Key strengths	Nr. of mentions	Key strengths	Nr. of mentions
Hydration points	6	Weather and location	4
Shuttle transport	6	Other aspects (prizes, kit, race categories, organizational flexibility)	9

This item was included to identify the most appreciated aspects of the event's organization, with the aim of highlighting strengths that can be maintained or enhanced in future editions. In the initial analysis of the 39 open-ended responses, the elements mentioned most frequently were the trail design, course markings and hydration points.

Table 6. Improvements Suggested for Future Editions

Category	Nr. of mentions	Example
Shuttle/transport service	30	*"A dedicated coordinator should manage the shuttle area, with queues formed in order of arrival."*
Timing and results	20	*"Half of the results were incorrect, a new timing team needed"*

Participants were asked to identify the organizational elements that they perceived as most in need of improvement. Analysis of the responses shows that the shuttle and transport service generated the highest number of mentions (n = 30), with participants indicating the need for a dedicated coordinator to manage the shuttle area and to organize queues. Timing and results were the second most frequently reported concern (n = 20), commonly associated with inaccuracies in recorded times and the perceived need for a new timing team.

DISCUSSIONS

The analysis of the Apuseni Bike Cup reveals distinct perspectives between organizers and participants regarding the effectiveness of operational and managerial aspects, as demonstrated by the responses collected. The success of a mountain bike competition is determined not only by the race itself but also by the quality of facilities and supplementary services provided to participants. Elements such as hydration stations, medical services, vendor areas, bike wash points and technical support stations directly contribute to the overall experience of riders and can significantly influence their perception of the professionalism of event organization (Bunning, Cole, & McNamee, 2016).

Resource-related issues represent a significant challenge in event management. The allocated budget is not always sufficient or optimally managed, which can affect access to essential materials, equipment and services. Additionally, a lack of transparency in resource allocation can lead to misunderstandings and potential conflicts. One recurring concern highlighted by an organizer emphasizes the limitations imposed by available resources stating that good ideas cannot be implemented due to insufficient funding. This issue underscores a significant barrier to effective project execution limiting the ability to expand the solutions proposed. Another significant issue relates to the uneven distribution of responsibilities within the team.

Frequently, certain tasks are handled by only a few individuals, which can lead to overwork and a decrease in the quality of their performance. Moreover, this situation may cause frustration and demotivation, as not all team members feel they are contributing fairly. In this context, organizers noted that a lack of clarity in role assignments generates confusion and inefficiency. To address this issue, the implementation of RACI matrix (Responsible, Accountable, Consulted, Informed), as proposed by Masterman, (2014), could provide a structured solution. For example, assigning overall event oversight to the Race Director, safety protocols to the Safety Director, trail management to Route Marshals, media to the Media Liaison, and logistics to the Logistics Officer. Applying such a framework would clarify roles, ensure equitable distribution of tasks and improve coordination.

Shuttle management was identified as a key operational challenge. Participants reported insufficient shuttle availability, resulting in long queues, boarding confusion and occasional use of private vehicles, creating unfair advantages. Equipment handling was also problematic, with some bicycles damaged during transport. Several participants suggested that shuttles should be reserved for training rather than incorporated into the competitive event. Time measuring and results management emerged as a major area of concern, with both organizers and participants reporting significant errors and inadequate handling. Most organizers explicitly acknowledged the timing issues, emphasizing the need for additional resources and more effective coordination with specialized external providers. Participants expressed high levels of dissatisfaction due to frequent mistakes and delays, which negatively impacted the perceived credibility and professionalism of the event.

In addition to the challenges and difficulties identified, the research highlighted several positive aspects that provided an encouraging outlook for future editions of the event. A key factor was the enthusiasm and active engagement of participants, which represented a valuable resource for any successful project. This positive attitude translates into a genuine willingness to collaborate and contribute to the continuous improvement of the event, potentially accelerating the resolution of operational issues.

Participants particularly valued the quality of the trails, describing them as challenging and well-aligned with the enduro spirit, providing a complete and satisfying experience. Although trail markings could be further improved, they were generally effective, allowing riders to focus on performance rather than navigation, which is essential for maintaining flow during the competition. In mountain bike enduro competitions, assessing trail safety and obtaining detailed participant feedback are essential for improving future editions (Tsuji et al., 2007). Another key strength identified is the support provided by volunteers and the organizing team. Despite some limitations, their visible commitment to assisting participants and ensuring smooth event operations represented a solid foundation upon which clearer and more efficient procedures can be developed.

Volunteer management involves strategic recruitment, comprehensive training and continuous motivation to ensure optimal performance. Ongoing monitoring enables real-time adjustments to operational strategies, maintaining high standards of quality and safety (Pott, Breuer, & ten Hompel, 2023). Another positive aspect is the transparency and openness of the organizers to feedback, even though not all issues were resolved perfectly. This attitude is essential for building trust and fostering a collaborative environment between participants and organizers.

Despite the criticisms raised, both groups involved in the study acknowledge a shared enthusiasm and positive potential for the event, which can serve as a strong foundation for its future development and for addressing the identified challenges.

CONCLUSIONS

The findings of this study show that operational management in mountain bike enduro events is a complex process that relies on coordinated planning, efficient communication and the ability to respond to unexpected situations. Event quality depends not only on trail design and safety measures, but also on how effectively resources are allocated, responsibilities are structured and teams coordinated across all operational stages. Key strengths identified include the systematic design and marking of trails, combined with the strategic placement of hydration stations, which together ensured efficient course flow throughout the event.

At the same time, several gaps emerged in transport logistics, timekeeping accuracy and external communication, highlighting the need for clearer role definitions, improved technical systems and stronger contingency planning. In conclusion, the study reinforces that effective operational management is

fundamental to ensuring both the credibility and long-term development of sporting events. As expectations continue to increase and organizational demands evolve, refining logistical systems, strengthening communication practices and improving team coordination will be essential steps towards enhancing future editions and advancing best practices in event management.

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